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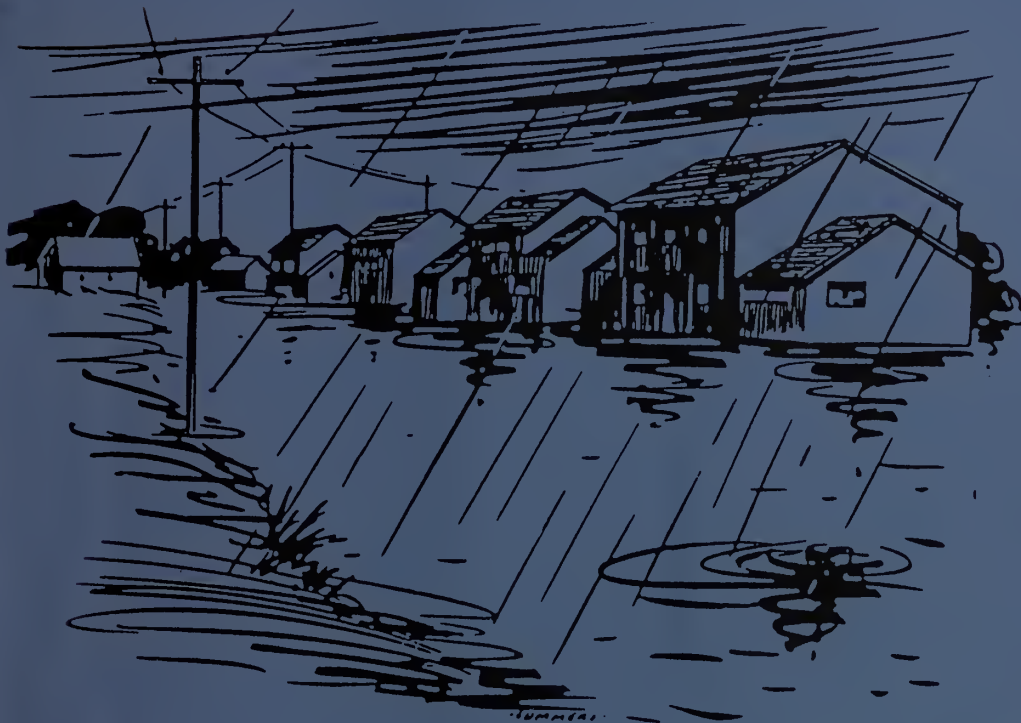
FLOOD PLAIN MANAGEMENT STUDY

CITY OF MELLEN

ASHLAND COUNTY, WISCONSIN

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CITY OF MELLEN



PREPARED BY THE

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

MADISON, WISCONSIN

IN COOPERATION WITH

ASHLAND COUNTY, WISCONSIN

AND THE

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

AUGUST 1984

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City of Mellen Flood Plain Management Study

Introduction

The purpose of this study is to define the flood characteristics of the Bad River and Devils Creek in the city of Mellen. The city of Mellen requested the study through Ashland County, Land Conservation Committee, and the Wisconsin Department of Natural Resources (DNR). The information acquired will enable them to develop an effective flood plain management program.

This report is prepared for use by the local people in planning the use and regulation of the Bad River and Devils Creek flood plain in the city of Mellen.

The 100-year and 500-year flood plains have been delineated. The high water elevations and flood plains are based on 5-year projected land use of the watershed, stream, flood plain, and existing road crossings.

The Soil Conservation Service carries out flood hazard studies in accordance with Federal Level Recommendation 3 of "A Unified National Program for Flood Plain Management," and Section 6 of Public Law 83-566. The principles contained in Executive Order 11988, Flood Plain Management, are addressed in this part.

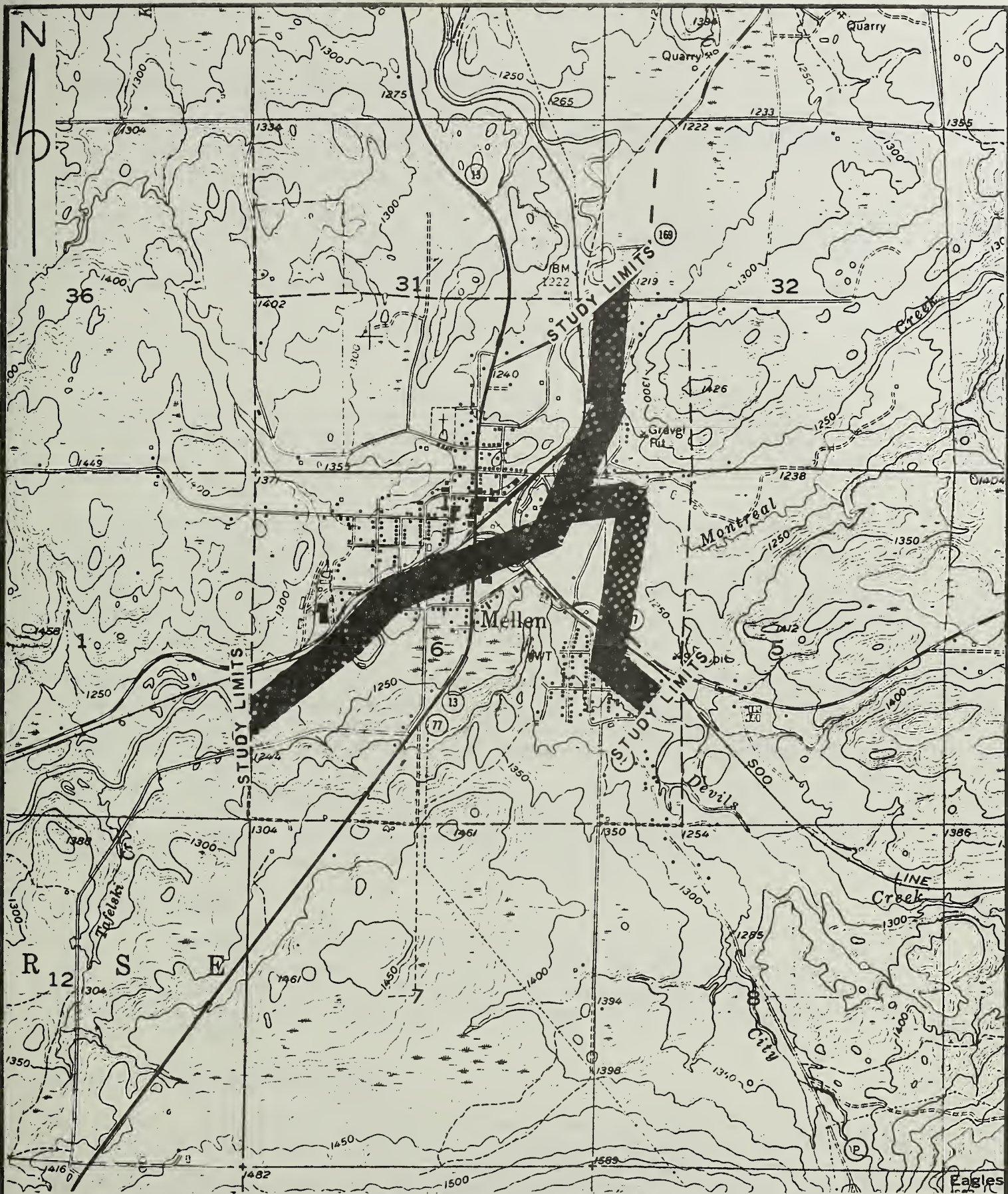
In Wisconsin, the Soil Conservation Service coordinates flood plain management studies with the Wisconsin DNR, through a joint coordination agreement entered into in October 1978. The Wisconsin Water Resources Act (Chapter 614, Laws of Wisconsin, 1965) authorizes the DNR, Division of Enforcement, to establish and upgrade minimum standards for flood plain regulations.

Study Area Description

The study area is located within the city of Mellen, in north central Wisconsin. This area consists of the flood plain that lies adjacent to approximately 2.27 miles of the Bad River and 1.1 miles of Devils Creek (see attached vicinity map). The downstream limit of the study is the city limits near State Highway 169. The upstream limit is the city limit near the veneer mill. The drainage area at the downstream limit is 133.8 square miles. The drainage area at the upstream limit is 101.4 square miles. Devils Creek has a drainage area of 14.9 square miles at the upstream limit and 16.0 square miles downstream. Mellen is in USGS Hydrologic Unit 04010302.

The climate is typically continental. January temperatures average 13.5° F. July, the warmest month, has an average temperature of 68° F. Precipitation averages 33.2 inches per year. Average annual snowfall is 70.7 inches.

The soils of the watershed consist of the Gogebic-Iron River-Kennan association which are well drained to moderately well drained soils, 20 to 60 inches deep over sandy loam till.



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SOIL CONSERVATION SERVICE

CITY OF MELLE
FLOOD PLAIN MANAGEMENT STUDY
ASHLAND COUNTY, WISCONSIN

APPROXIMATE SCALE IN FEET

2000 0 2000 4000 6000

VICINITY MAP

FIGURE 1

NATURAL AND BENEFICIAL FLOOD PLAIN VALUES

The flood plain in the study area consists of wetlands of trees, shrubs, and some scattered grass meadows. Trees are typical lowland species such as black ash, soft maple, aspen, willow, and tag alder.

The Bad River through the Mellen area is a marginal trout stream (class III). It does however contain walleye, suckers, northern pike, muskellunge, rock bass, black crappie, and pumpkinseed fish. Devils Creek is a class I trout stream containing brown trout, brook trout, and rainbow trout.

The flood plain provides a natural storage area for large amounts of floodwater during peak flows.

It also provides habitat for a large number of wildlife species such as white-tailed deer, racoon, mink, muskrat, fox, and otter. Bird species include numerous songbirds, woodpeckers, hawks, owls, ruffed grouse, mallards, blue-winged teal, and wood ducks. The numerous dead elm trees in the area serve as den and nest sites for numerous birds and mammals.

Part of the study area is in the special DNR fisher management area. The fisher is a mammal species that is on the state list of threatened and endangered species in the "watch" category. There are restrictions on land trapping to help protect fishers but there are no restrictions on land use. The DNR does not have any other records of plants or animal species that are on the threatened or endangered list in the study area.

The Bad River from Mellen to Lake Superior is listed on the Department of Interior Nationwide Rivers Inventory, a list of the Nation's significant free-flowing streams. It is listed because of its beauty and geologic values. By maintaining an undeveloped flood plain, these values will be maintained.

There is no prime farmland in the study area. There are no sites on the National Register of Historic Places, or sites with local important historical or cultural values. The Mellen City Hall is on the National Register of Historic Places, however, it is not in the flood plain study area.

Flooding Problems

Much of the severe flooding on the Bad River was caused by failure of dams built during the logging era. The floods of 1946 and 1949 are examples, the dams have since been removed and building has been regulated in the flood plain of the 1946 flood. These precautions have helped alleviate many of the flooding problems.

Existing Flood Plain Management

Mellen has a flood plain ordinance that was adopted in May 1975 and approved by the state in June 1975. The city is using the 1946 flood lines to regulate the ordinance. The city is in the Emergency Flood Insurance Program administered by the Federal Emergency Management Administration (FEMA) and have only flood hazard maps for guidance. The flood plain floodway maps from this study will be incorporated into the existing ordinance.

Alternatives for Mitigating Flood Damages to Existing and Future Development


- A. The city will incorporate the flood plain-floodway maps in this study into their floodplain ordinance and continue enforcement.
- B. Apply existing standards set forth in the village's subdivision control ordinance to regulate development in nonsuitable areas and minimize erosion and diffused surface water runoff within the watershed.
- C. Relocate homes in the floodway and flood-proof those existing homes in the flood fringe by elevating, filling basements, and providing dry land access during floods. The city has been following this alternative and few houses remain in the flood plain.


Appendix A

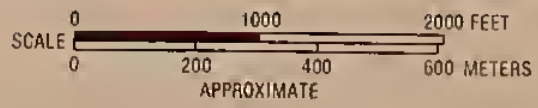
FLOOD BOUNDARY MAPS



LEGEND

 Stream Channel

 Sheet Coverage



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FLOOD PLAIN MANAGEMENT STUDY
ASHLAND COUNTY, WISCONSIN

VICINITY AND SHEET INDEX MAP

CITY OF MELLER



USDA/SCS/FORT WORTH, TEXAS 1984

- 100 Year Flood Hazard Area

100 Year Flood Fringe
- LEGEND

X

Elevation Reference Marks

Stream Channel

Limits of flooding may vary from actual location on the ground.

SCALE

0

200

400 FEET

0

50

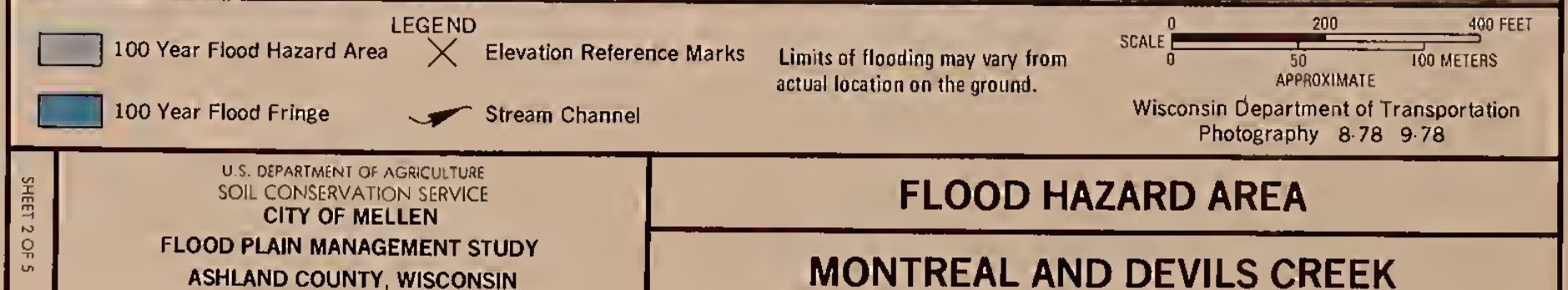
100 METERS

APPROXIMATE

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ASHLAND COUNTY, WISCONSIN

FLOOD HAZARD AREA
BAD RIVER





100 Year Flood Hazard Area

100 Year Flood Fringe

LEGEND

X

Elevation Reference Marks

Stream Channel

Limits of flooding may vary from actual location on the ground.

0 200 400 FEET

0 50 100 METERS

SCALE

APPROXIMATE

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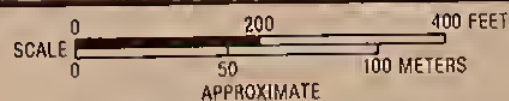
FLOOD HAZARD AREA

DEVILS CREEK



- LEGEND**
- 100 Year Flood Hazard Area
 - 100 Year Flood Fringe
 - Elevation Reference Marks
 - Stream Channel

Limits of flooding may vary from actual location on the ground.



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ASHLAND COUNTY, WISCONSIN

FLOOD HAZARD AREA

BAD RIVER



100 Year Flood Hazard Area

100 Year Flood Fringe

×

Elevation Reference Marks

Stream Channel

Limits of flooding may vary from actual location on the ground.

SCALE
0 200 400 FEET
0 50 100 METERS
APPROXIMATE

Wisconsin Department of Transportation
Photography 8-78 9-78

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FLOOD HAZARD AREA
BAD RIVER

Appendix B

FLOOD PROFILES

LEGEND

500-YEAR FLOOD
100-YEAR FLOOD
50-YEAR FLOOD
10-YEAR FLOOD
STREAM BED
LOW BANK

CROSS SECTION LOCATION
BRIDGE FLOOR
LOW POINT IN ROAD
LOW CHORD
HIGH WATER MARK



ELEVATION IN FEET (MSL)

SCALE IN HORIZONTAL FEET

230

220

210

2680+00

2690+00

2700+00

2710+00

STATIONS - FEET

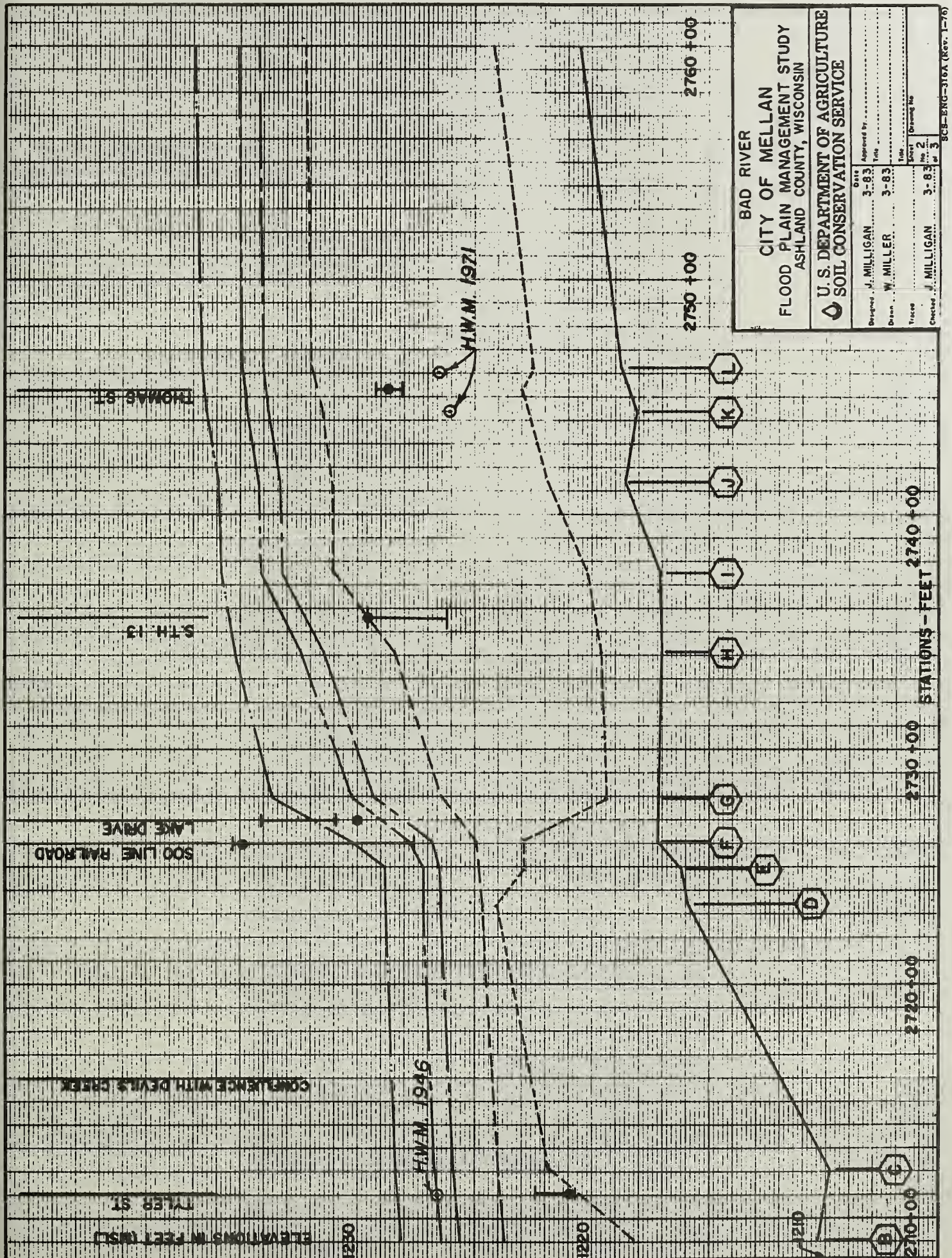


BAD RIVER

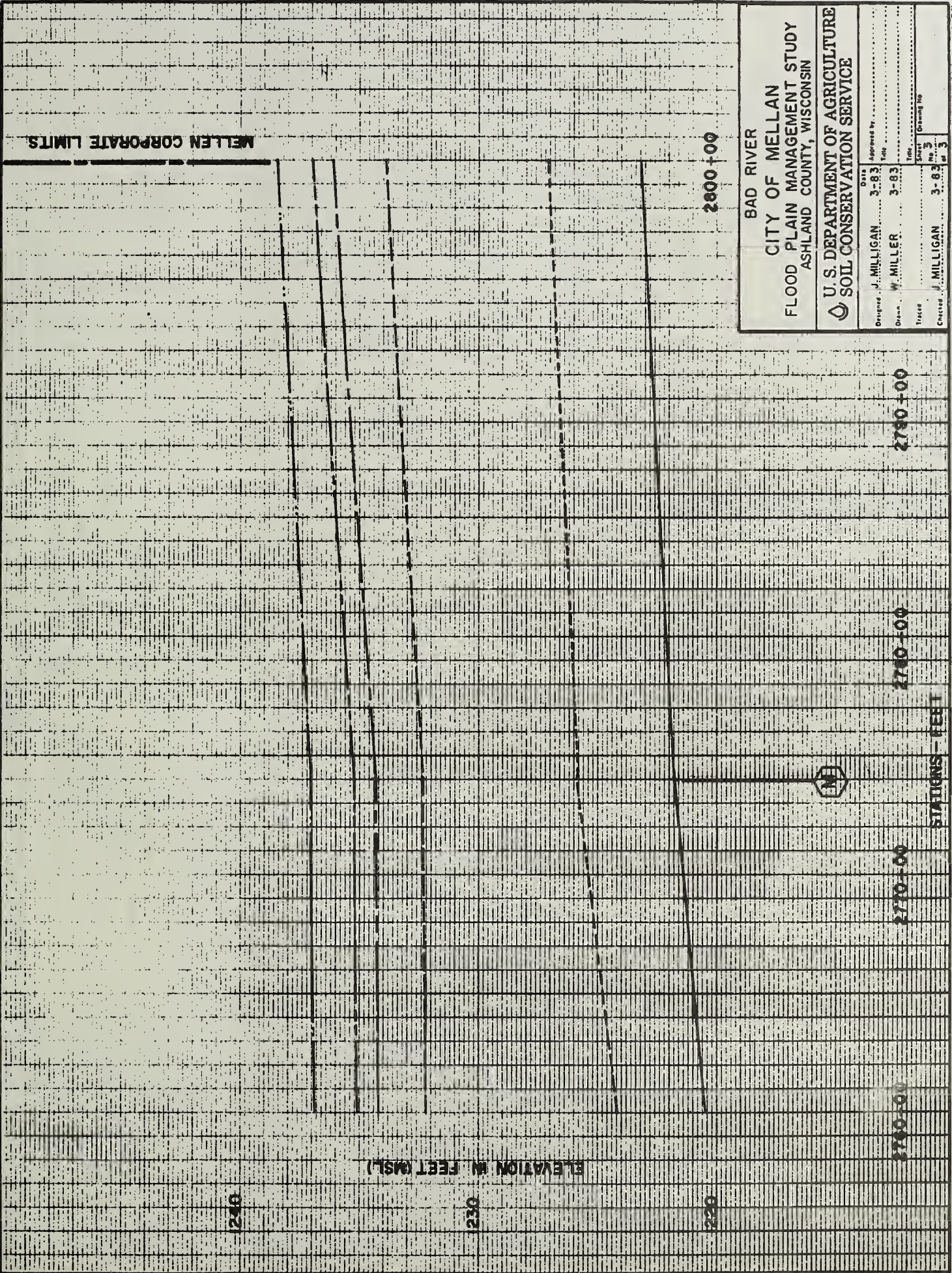
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FLOOD PLAIN MANAGEMENT STUDY
ASHLAND COUNTY, WISCONSIN

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| | | | |
|----------|-------------|-------------|---------|
| Engineer | J. MILLIGAN | Date | 3-83 |
| Drawn | W. MILLER | Approved By | |
| Traced | | Title | |
| Checked | J. MILLIGAN | Scale | 1" = 3' |
| | | Sheet | 1 of 3 |



| | |
|---------------------------------|---------------|
| BAD RIVER | |
| CITY OF MELLAN | |
| FLOOD PLAIN MANAGEMENT STUDY | |
| ASHLAND COUNTY, WISCONSIN | |
| U. S. DEPARTMENT OF AGRICULTURE | |
| SOIL CONSERVATION SERVICE | |
| Designed by J. MILLIGAN | Date 3-83 |
| Drawn by W. MILLER | 3-83 |
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| Checked by J. MILLIGAN | 3-83 |
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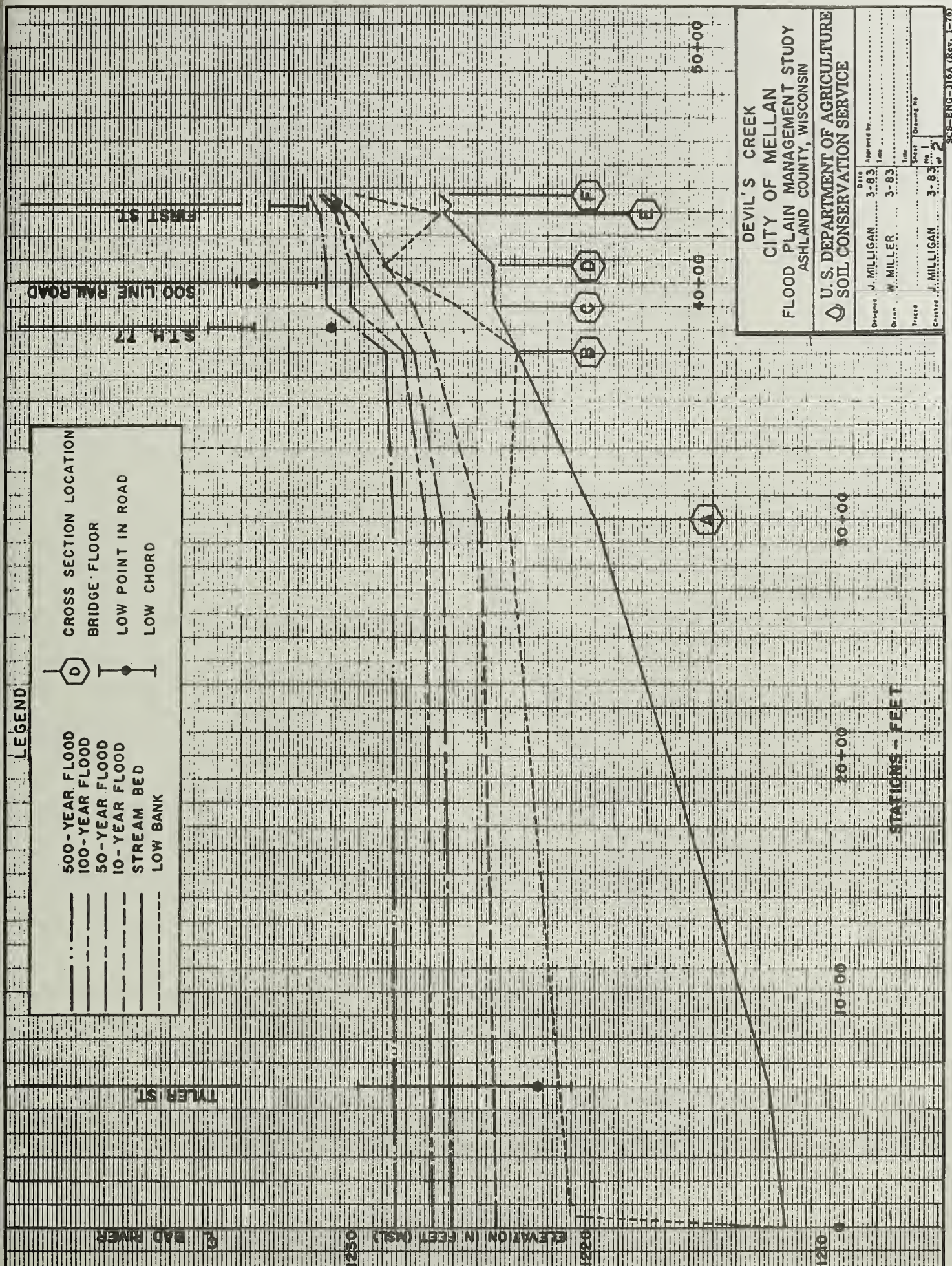


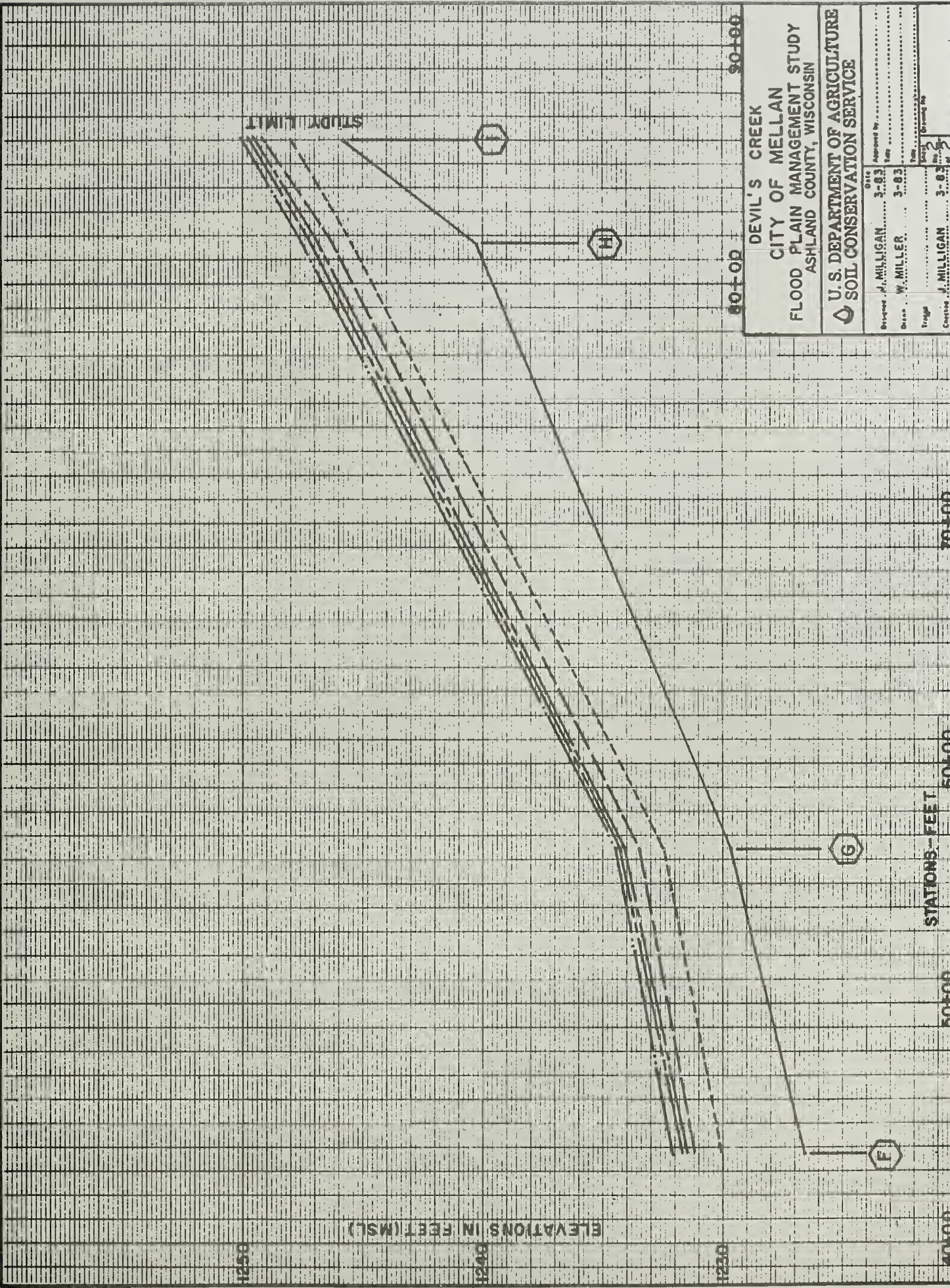
MELLEN CORPORATE LIMITS

2900+00

BAD RIVER
CITY OF MELLAN
FLOOD PLAIN MANAGEMENT STUDY
ASHLAND COUNTY, WISCONSIN
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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| | |
|---------------------------------|-------------|
| DEVIL'S CREEK | |
| CITY OF MELLAN | |
| FLOOD PLAIN MANAGEMENT STUDY | |
| ASHLAND COUNTY, WISCONSIN | |
| U. S. DEPARTMENT OF AGRICULTURE | |
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| Designed by J. MILLIGAN | Date 3-83 |
| Drawn by W. MILLER | Date 3-83 |
| Checked by J. MILLIGAN | Date 3-83 |
| Project No. | Sheet No. 2 |
| Drawn by | Checked by |

Appendix C

TYPICAL SECTIONS

TYPICAL CROSS SECTIONS

CITY OF MELLAN

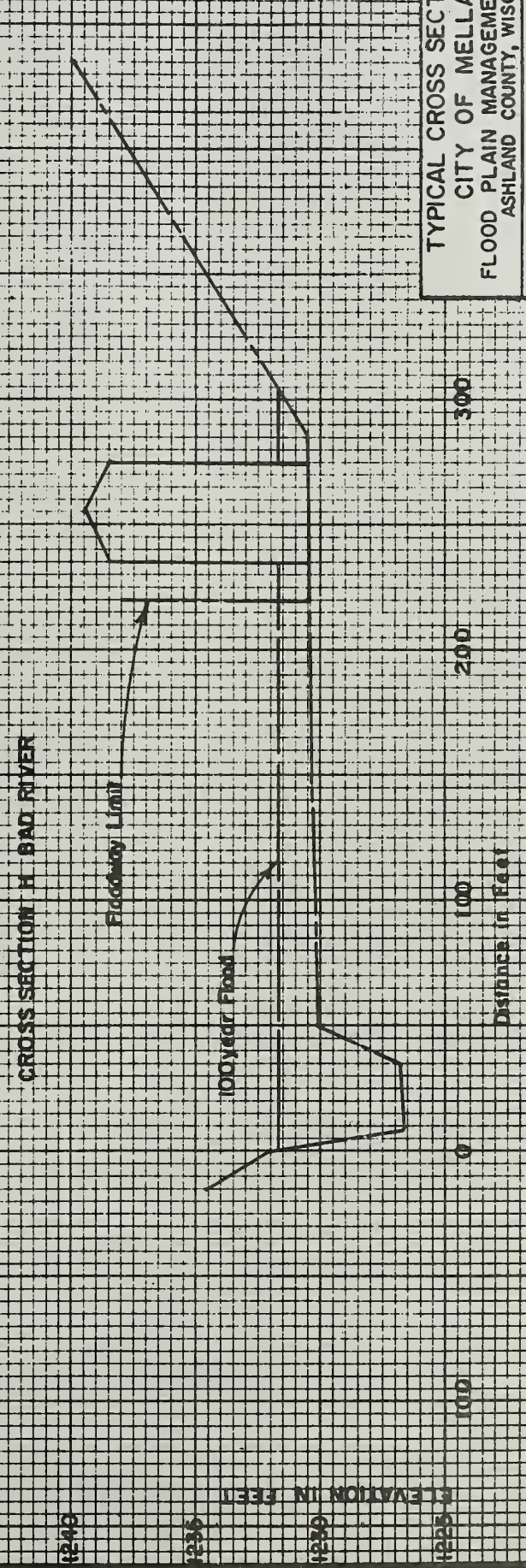
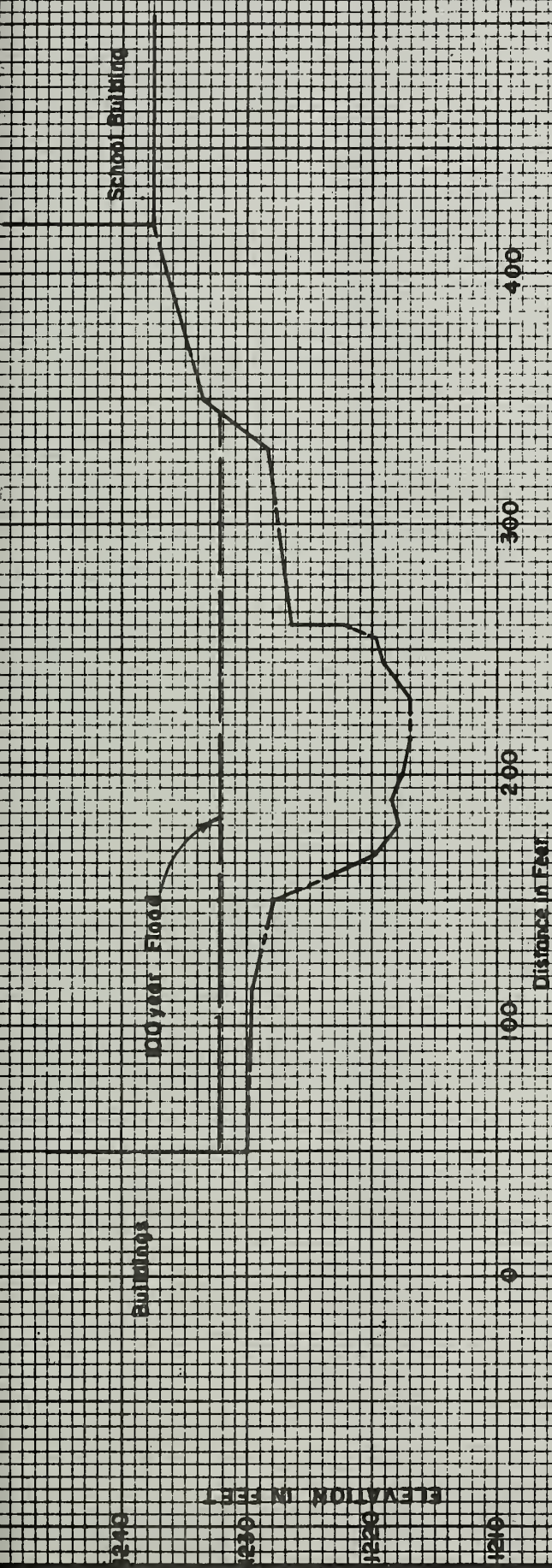
FLOOD PLAIN MANAGEMENT STUDY

ASHLAND COUNTY, WISCONSIN

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SOIL CONSERVATION SERVICE

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| Designed by | J. MILLIGAN | Date | 3-83 |
| Drawn by | W. MILLER | Date | 3-83 |
| Checked by | J. MILLIGAN | Date | 3-83 |
| Approved by | | Date | |



Appendix D

LIST OF ELEVATION REFERENCE MARKS

ELEVATION REFERENCE MARKS

| <u>Reference Mark</u> | <u>Elevation (MSL)</u> | <u>Description</u> |
|---------------------------|----------------------------|--|
| 1 | 1220.03 | Reference Mark 30 from Ashland County Flood Insurance Study (6), TBM 813, survey book for above study. Cross-chiseled on top of curb on left downstream side of Highway 169 bridge over the Bad River. |
| 2 | 1223.02 | TBM819. Cross-chiseled in top of curb on right downstream side of Tyler Street bridge over the Bad River. |
| 3 | 1230.90 | TBM822. Railroad spike driven in base of pine tree at intersection of Lake Drive and Fayette Ave. The tree is on the right bank of the Bad River downstream of the bridge. |
| 4 | 1230.35 | TBM834. Cross-chiseled on top of curb on left upstream side of Highway "13" bridge over the Bad River. |
| 5 | 1228.95 | TBM839. Cross-chiseled in top of bridge abutment on left upstream side of Thomas Street bridge over the Bad River. |
| 6 | 1240.47 | TBM842. Nail driven in base of power pole #7 on County Highway "GG" across from veneer mill. |
| 7 | 1230.88 | TBM#4. Railroad spike in power pole on Butler Street across from the city garage, from city of Mellen. Watermain extension plan Job No. 01072-82002, sheet A7195-SA-3. |
| 8 | 1229.65 | TP1. Double-headed forming nail in power pole on curve in Lake Drive. Pole is on the northeast side of street. |
| 9 | 1238.38 | TP2. Double-headed forming nail in power pole No. 601 on the southwest corner of 1st street and Lake Drive. |
| 10 | 1243.24 | TP3. Double-headed forming nail in power pole on northeast corner of Lake Street, 2nd Avenue and Drake Streets. |

ELEVATION REFERENCE MARKS

| <u>Reference Mark</u> | <u>Elevation (MSL)</u> | <u>Description</u> |
|---------------------------|----------------------------|---|
| 11 | 1249.14 | TP4. Spike in power pole on east side of Lake Drive, 265 feet north of 3rd Avenue. |
| 12 | 1250.45 | TBM7. Double-headed forming nail in power pole on northeast corner of alley and 3rd Street across from House No. 705. |
| 13 | 1262.46 | TBM8. Top of east nut on hydrant south of House No. 905 Lake Drive (County Trunk Highway "P"). |
| 14 | 1252.51 | TBM9. Spike in power pole, 40 feet north of pump station on Lake Drive. |
| 15 | 1235.11 | TP20. Head of spike on top of timber abutment. Northeast corner of railroad bridge over Devils Creek. |

Appendix E

TABULATION OF
WATER SURFACE ELEVATIONS
DISCHARGES
AND
FLOODWAY DATA

| Flooding Source | | Discharge - Elevation | | | | | | | | | |
|-----------------|------------------------|-----------------------|--------------|----------|--------------|----------|--------------|----------|--------------|----------|--------------|
| Cross-section | Distance $\frac{1}{2}$ | 10 year | | 50 year | | 100 year | | 500 year | | | |
| Bad River | | Q CFS | Elev. MSL | Q CFS | Elev. MSL | Q CFS | Elev. MSL | Q CFS | Elev. MSL | Q CFS | Elev. MSL |
| A | 269,450 | 3700 | 1221.9 | 5600 | 1223.4 | 6450 | 1224.0 | 8600 | 1225.4 | 8600 | 1225.4 |
| B | 270,930 | 3700 | 1223.7 | 5600 | 1225.6 | 6450 | 1226.4 | 8600 | 1228.1 | 8600 | 1228.1 |
| | 271,130 | Tyler Street | | | | | | | | | |
| C | 271,230 | 3700 | 1224.0 | 5600 | 1225.9 | 6450 | 1226.7 | 8600 | 1228.4 | 8600 | 1228.4 |
| D | 272,350 | 3700 | 1224.7 | 5600 | 1226.5 | 6450 | 1227.2 | 8600 | 1228.8 | 8600 | 1228.8 |
| E | 272,500 | 3700 | 1224.8 | 5600 | 1226.5 | 6450 | 1227.2 | 8600 | 1228.6 | 8600 | 1228.6 |
| | 272,600 | Soo Line Railroad | | | | | | | | | |
| F | 272,620 | 3700 | 1224.9 | 5600 | 1226.8 | 6450 | 1227.8 | 8600 | 1230.2 | 8600 | 1230.2 |
| | 272,700 | Lake Drive | | | | | | | | | |
| G | 272,800 | 3700 | 1226.4 | 5600 | 1229.3 | 6450 | 1230.2 | 8600 | 1233.6 | 8600 | 1233.6 |
| H | 273,420 | 3700 | 1228.4 | 5600 | 1231.4 | 6450 | 1232.4 | 8600 | 1235.2 | 8600 | 1235.2 |
| | 273,570 | State Highway 13 | | | | | | | | | |
| I | 273,770 | 3700 | 1231.0 | 5600 | 1233.2 | 6450 | 1234.1 | 8600 | 1235.8 | 8600 | 1235.8 |
| J | 274,140 | 3700 | 1231.1 | 5600 | 1233.3 | 6450 | 1234.2 | 8600 | 1235.9 | 8600 | 1235.9 |
| K | 274,430 | 3700 | 1231.5 | 5600 | 1233.8 | 6450 | 1234.7 | 8600 | 1235.4 | 8600 | 1235.4 |
| | 274,540 | Thomas Street | | | | | | | | | |
| L | 274,630 | 3700 | 1232.0 | 5600 | 1234.0 | 6450 | 1234.9 | 8600 | 1236.6 | 8600 | 1236.6 |
| M | 277,390 | 3700 | 1232.3 | 5600 | 1234.3 | 6450 | 1235.2 | 8600 | 1237.0 | 8600 | 1237.0 |

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CITY OF MELLE
FLOOD PLAIN MANAGEMENT STUDY
ASHLAND COUNTY, WISCONSIN

DISCHARGE - ELEVATION DATA

BAD RIVER

TABLE 1

| Flooding Source | | Discharge - Elevation | | | | | | | |
|-----------------|------------------------|-----------------------|--------------|----------|--------------|----------|--------------|----------|--------------|
| Cross-section | Distance $\frac{1}{2}$ | 10 year | | 50 year | | 100 year | | 500 year | |
| Devils Creek | | Q CFS | Elev. MSL | Q CFS | Elev. MSL | Q CFS | Elev. MSL | Q CFS | Elev. MSL |
| A | 3,000 | 560 | 1224.8 | 810 | 1226.5 | 930 | 1227.2 | 1200 | 1228.8 |
| B | 3,720 | 560 | 1226.9 | 810 | 1227.7 | 930 | 1228.2 | 1200 | 1228.9 |
| C | 3,820 | State Highway 77 | | | | | | | |
| | 3,920 | 560 | 1228.7 | 810 | 1229.9 | 930 | 1230.4 | 1200 | 1231.4 |
| | 4,000 | Soo Line Railroad | | | | | | | |
| D | 4,070 | 560 | 1228.9 | 810 | 1229.9 | 930 | 1230.4 | 1200 | 1231.4 |
| E | 4,290 | 560 | 1230.1 | 810 | 1230.7 | 930 | 1231.0 | 1200 | 1231.7 |
| | 4,330 | First Street | | | | | | | |
| F | 4,370 | 560 | 1231.2 | 810 | 1231.5 | 930 | 1231.7 | 1200 | 1232.1 |
| G | 5,650 | 560 | 1233.5 | 810 | 1234.1 | 930 | 1234.3 | 1200 | 1234.5 |
| H | 8,170 | 560 | 1246.3 | 810 | 1246.9 | 930 | 1247.2 | 1200 | 1247.6 |
| I | 8,610 | 560 | 1249.2 | 810 | 1249.6 | 930 | 1249.8 | 1200 | 1250.1 |

$\frac{1}{2}$ Distance in feet from confluence with Bad River

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City of Mellen
Flood Plain Management Study
Ashland County, Wisconsin

DISCHARGE - ELEVATION DATA

DEVILS CREEK

TABLE 1

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION ² | | |
|------------------------|-----------------------|-------------|------------------------|------------------------|---|---------------------------|------------------|
| CROSS SECTION | DISTANCE ¹ | WIDTH (FT.) | SECTION AREA (SQ. FT.) | MEAN VELOCITY (F.P.S.) | WITH FLOODWAY (M.S.L.) | WITHOUT FLOODWAY (M.S.L.) | DIFFERENCE (FT.) |
| <u>Bad River</u> | | | | | | | |
| A | 269450 | 325 | 1600 | 9.4 | 1224.0 | 1224.0 | 0 |
| B | 270930 | 798 | 4273 | 4.8 | 1226.4 | 1226.4 | 0 |
| C | 271230 | 730 | 4425 | 3.0 | 1226.7 | 1226.7 | 0 |
| D | 272350 | 750 | 1113 | 5.8 | 1227.2 | 1227.2 | 0 |
| E | 272500 | 100 | 1113 | 8.0 | 1227.2 | 1227.2 | 0 |
| F | 272620 | 84 | 688 | 9.4 | 1227.8 | 1227.8 | 0 |
| G | 272800 | 158 | 971 | 10.7 | 1230.2 | 1230.2 | 0 |
| H | 273420 | 345 | 2259 | 4.5 | 1232.4 | 1232.4 | 0 |
| I | 273770 | 306 | 2170 | 5.0 | 1234.1 | 1234.1 | 0 |
| J | 274140 | 347 | 2179 | 6.5 | 1234.2 | 1234.2 | 0 |
| K | 274430 | 491 | 2804 | 4.0 | 1234.7 | 1234.7 | 0 |
| L | 274630 | 363 | 3040 | 2.1 | 1234.9 | 1234.9 | 0 |
| M | 277390 | 765 | 2163 | 8.6 | 1235.2 | 1235.2 | 0 |
| <u>Devils Creek 3/</u> | | | | | | | |
| A | 3000 | 664 | 1499 | .62 | 1227.2 | 1227.2 | 0 |
| B | 3720 | 134 | 348 | 2.7 | 1228.2 | 1228.2 | 0 |
| C | 3920 | 850 | 2040 | .45 | 1230.4 | 1230.4 | 0 |
| D | 4070 | 500 | 510 | 1.8 | 1230.4 | 1230.4 | 0 |
| E | 4290 | 220 | 540 | 1.6 | 1231.0 | 1231.0 | 0 |
| F | 4370 | 220 | 468 | 2.0 | 1231.7 | 1231.7 | 0 |
| G | 5650 | 510 | 393 | 2.4 | 1234.3 | 1234.3 | 0 |
| H | 8170 | 125 | 213 | 4.4 | 1247.2 | 1247.2 | 0 |
| I | 8610 | 611 | 273 | 3.4 | 1249.8 | 1249.8 | 0 |

1/ Distance in feet from confluence with Lake Superior 2/ Elevations without ice jam effect

3/ Distance in feet from confluence with the Bad River

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CITY OF MELLER
FLOOD PLAIN MANAGEMENT STUDY
ASHLAND COUNTY, WISCONSIN

FLOODWAY DATA

BAD RIVER & DEVILS CREEK

TABLE 2

Appendix F

INVESTIGATIONS AND ANALYSIS

Investigation and Analysis

The Bad River was studied in detail by the Federal Emergency Management Administration (FEMA) for the Ashland County Flood Insurance Study. The data used for the areas upstream and downstream of the corporate limits was found to be continuous through the city. The data was verified and used for that portion of the river within the corporate limits.

Devils Creek, a tributary to the Bad River, was modeled using SCS procedures. The creek was surveyed from its confluence with the Bad River upstream to the pumphouse near the eastern corporate limits. A hydrologic model using a computer program titled 'Computer Program for Project Formulation, Hydrology SCS-TR20' (TR20), was developed to determine the flood flows. The resultant flows and survey data were used along with a computer program for computing water surface profiles titled "WSP2 Computer Program, Technical Release No. 61" (WSP2) to obtain the flood elevation through the city.

The flooded area, water surface elevation and flood widths are shown in appendicies A, B, and E.

The natural and beneficial flood plain values were documented by the SCS state staff biologist who made a field visit to the study area and also made a literature search of the Wisconsin Department of Natural Resources and United States Department of Interior records and reports to gain other information about the study area.

Appendix G

GLOSSARY

GLOSSARY

CHAPTER NR. 116, WISCONSIN'S FLOOD PLAIN MANAGEMENT PROGRAM NR. 116.03 DEFINITIONS

Channel. A channel is a natural or artificial watercourse with definite bed and banks to confine and conduct the normal flow of water.

Department. Department refers to the State of Wisconsin Department of Natural Resources.

Encroachment. An encroachment is any fill, structure, building, use, accessory use, or development in the floodway.

Encroachment/Floodway Lines. Encroachment/floodway lines are limits of obstruction to floodflows. These lines are on both sides of and generally parallel to the river or stream. The lines are established by assuming that the area landward (outside) of the encroachment/floodway lines will be ultimately developed in such a way that it will not be available to convey floodflows.

Equal Degree of Hydraulic Encroachment. The effect of any encroachment into the floodway must be computed by assuming an equal degree of hydraulic encroachment on the other side of a river or stream for a hydraulic reach. This computation assures that property owners up, down, or across the river or stream will have the same rights of hydraulic encroachment. Encroachments are analyzed on the basis of the effect upon hydraulic conveyance, not upon the distance the encroachment extends into the floodway. Also see: Hydraulic Reach.

Flood. A general and temporary condition of partial or complete inundation of normally dry land areas caused by the overflow or rise of rivers, streams, or lakes.

Flood Frequency. The term flood frequency is a means of expressing the probability of flood occurrences and is generally determined from statistical analyses. The frequency of a particular floodflow is usually expressed as occurring, on the average, once in a specified number of years. Any particular floodflow could, however, occur more frequently than once in any given year.

Flood Fringe. The flood fringe is that portion of the flood plain outside of the floodway, which is covered by floodwaters during the regional flood; it is generally associated with standing water rather than rapidly flowing water.

Flood Plain. The flood plain is the land which has been or may be hereafter covered by floodwater during the regional flood. The flood plain includes the floodway and the flood fringe.

Flood Plain Management. Flood plain management involves the full range of public policy and action for insuring wise use of flood plains. It includes everything from the collection and dissemination of flood control information to actual acquisition of flood plain lands; and the enactment and administration of codes, ordinances, and statutes for land use in the flood plain.

Flood Proofing. Flood proofing involves any combination of structural provisions, changes, or adjustments to properties and structures subject to flooding, primarily for the purpose of reducing or eliminating flood damage to properties, water and sanitary facilities, structures and contents of buildings in flood hazard areas.

Flood Protection Elevation. The flood protection elevation shall correspond to a point 2 feet of freeboard above the water surface profile associated with the regional flood and the official floodway lines. Also see: Freeboard.

Floodway. The floodway is the channel of a river or stream and those portions of the flood plain adjoining the channel required to carry and discharge the floodwater or floodflows associated with the regional flood.

Freeboard. Freeboard is a factor of safety usually expressed in terms of a certain amount of feet above a calculated flood level. Freeboard compensates for the many unknown factors that contribute to flood heights greater than the height calculated. These unknown factors include, but are not limited to, ice jams, debris accumulation, wave action, obstruction of bridge openings and floodways, the effects of urbanization on the hydrology of the watershed, loss of flood storage areas due to development and aggradation of the river or streambed.

High Flood Damage Potential. High flood damage potential is associated with any danger to life or health and any significant economic loss to a structure or building or its contents.

Hydraulic Floodway Lines. Hydraulic floodway lines shall delineate the channel of the river or stream and those portions of the adjoining flood plains which are reasonably required to carry and discharge the regional floodflow without any measurable increase in flood heights.

Hydraulic Reach. A hydraulic reach along a river or stream is that portion of the river or stream extending from one significant change in the hydraulic character of the river or stream to the next significant change. These changes are usually associated with breaks in the slope of the water surface profile, and may be caused by bridges, dams, expansion and contraction of the waterflow, and changes in streambed slope or vegetation.

Levee. A levee is a continuous dike or embankment of earth constructed parallel to a river or stream to prevent flooding of certain areas of land.

Official Floodway Lines. Official floodway lines are those lines which have been adopted by the county, city, or village, approved by the department, and which are shown on the official flood plain zoning maps and used for regulatory purposes.

Regional Flood. The regional flood is a flood determined to be representative of large floods known to have generally occurred in Wisconsin and which may be expected to occur on a particular stream because of like physical characteristics. The regional flood is based upon a statistical analysis of streamflow records available for the watershed and/or an analysis of rainfall and runoff characteristics in the general watershed region. The flood frequency of the regional flood is once in every 100 years; this means that in any given year there is a 1 percent chance that the regional flood may occur. During a typical 30-year mortgage period, the regional flood has a 26 percent chance of occurring.

Structure. A structure is any manmade object with form, shape, and utility, either permanently or temporarily attached to or placed upon the ground, riverbed, streambed, or lakebed.

Watershed. A watershed is a region or area contributing ultimately to the water supply of a particular watercourse or body of water.

Water Surface Profile. The water surface profile is a graphical representation of the height of the water surface throughout a county, city, or village based upon a certain flow passing through the river or stream. A water surface profile based upon flows occurring during a regional flood is used in regulating the flood plain areas.

Appendix H

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